I. REMARKS/ARGUMENTS

A. General

The application still contains 56 claims. The claims have not been amended since the previous response.

Claims 52 and 56 remain cancelled.

B. Acknowledgement of Allowance

The Applicant gratefully acknowledges the allowance of claims 5-24, 38 and 39, as indicated by the Examiner on page 17 of the Office Action.

C. Summary of First Rejection under 35 USC §103(a) and Response

On page 2 of the Office Action, the Examiner has rejected claims 1-3, 25-27, 30, 36, 37, 40-51 and 57 under 35 USC §103(a) as being unpatentable over Canadian Patent 2,292,828 (hereafter referred to as Lyon) in view of US Patent 7,002,980 (hereafter referred to as Brewer).

For the reasons presented below, the Applicant respectfully submits that claims 1-3, 25-27, 30, 36, 37, 40-51 and 57, as they currently stand, are in allowable form.

Claims 1-3, 25-27, 30, 36, 44 and 45

The Examiner's attention is respectfully directed to the following emphasized features of independent claim 1.

> **Claim 1**
> A method of regulating packet flow through a device having a processing fabric with at least one input port and at least one output port, a control entity connected to the at least one input port for regulating packet flow thereto, and a

plurality of egress queues connected to the at least one output port for temporarily storing packets received therefrom, said method comprising:

obtaining bandwidth utilization information regarding packets received at the egress queues, **wherein obtaining said bandwidth utilization information includes determining the amount of bandwidth consumed by packets received at each of said egress queues;**

determining, from the bandwidth utilization information and the amount of bandwidth consumed by packets received at each of said egress queues, a discard probability associated with each egress queue; and

providing the discard probability associated with each egress queue to the control entity, for use by the control entity in selectively transmitting packets to the at least one input port of the processing fabric.

Concerning Lyon

The Applicant's remarks echo those made in the previous response, and are worthy of being expanded here. To begin with, it will be appreciated that Lyon measures the <u>depth</u> of egress queues (p.12, lines 16-17), which is merely a number of bits stored at the egress queues. This is completely different from the (claimed) feature of determining the amount of <u>bandwidth</u> consumed by packets at the egress entity. More specifically, the amount of bandwidth consumed by packets is a measure of *bits per second* (*i.e.* a rate of arrival). Thus, it is clear that Lyon does not disclose the above-emphasized feature of "determining the amount of bandwidth consumed by packets received at each of said egress queues".

Secondly, since Lyon does not determine the amount of bandwidth consumed by packets received at each egress queue, it is naturally impossible for Lyon to determine a discard probability based on such information. Thus, and not surprisingly, the Examiner concedes on page 2 of the Office Action that Lyon does not disclose the above-emphasized feature of "determining from the bandwidth utilization information and the amount of bandwidth consumed by packets received at each egress queue, a discard probability associated with each egress queue".

Concerning Brewer

In the Office Action, the Examiner alleges that the two above-emphasized features of claim 1 are disclosed by Brewer. The Examiner's argument is based on the observation that Brewer determines a time-weighed average byte count of a queue. This has been interpreted by the Examiner as a unit of data per unit time and has led the Examiner to allege that Brewer's time-weighted average byte count of a queue is equivalent to bandwidth, thus allegedly defeating patentability of claims 1-3, 25-27, 30, 36, 44 and 45.

However, and in the Applicant's respectful view, the Examiner has committed in this Office Action as in the last Office Action a basic, fundamental error, namely that of equating the time-weighted average byte count of a queue to the bandwidth being consumed by packets received at the queue. The Applicant respectfully submits that the Examiner's incorrect interpretation of Brewer has correspondingly led to a misguided finding of obviousness when, in fact, the above-mentioned features of claim 1 are completely absent from Brewer, as set forth herein below.

Specifically, bandwidth is a dynamic quantity that is a measure of data per unit time. However, time-weighting the depth of a queue over time, as is done in Brewer, does not yield the same result. Quite simply, because a queue can be filled and emptied at independent rates, its time-average depth bears no relation to the rate at which it is being emptied (or filled). In fact, the measurement unit of a time-weighted queue depth is a number of **bytes**, while the measurement unit of bandwidth is a number of **bytes per unit time**.

To be precise, Brewer's quantity is a sum of a plurality of quantities of bytes with each such quantity of bytes being attributed a weight in the form of a percentage or fraction (with the weights of all the quantities of bytes generally adding up to 100%). Thus, a time-weighted average byte count is an average of **byte counts**, with certain of the byte-count values factored into the average being given greater importance then other. Nevertheless, it remains an average of byte counts, which necessarily implies that it has a measurement

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unit of bytes (data), not data per unit time (data rate). The two quantities are not interchangeable, and in not recognizing this fact, the Examiner has, in the Applicant's respectful view, been led into error.

To use a simple analogy, the daily weighted average moisture level of a homeowner's front lawn (which receives water via rain and loses water via drainage into the earth) gives no indication whatsoever of the rate at which rain is falling or the rate at which moisture is actually draining into the earth, regardless of whether some (e.g., more recent) days are given a greater or lesser statistical importance than other days.

To use another simply analogy, an observer sampling an average of number of cars waiting at a red light would obtain a **number of cars** to report to his boss, regardless of whether he attributed more statistical importance (weight) to recently arrived vehicles. This would not, however, allow his boss to determine the rate of arrival or departure of those cars, and therefore his boss would not be able to judge the traffic flow (**number of cars per unit time**) at that intersection.

For the Examiner's further consideration, the Applicant provides the following detailed but of course non-limiting illustration, which is an example provided in the previous response, but adapted to account for Brewer. Specifically, consider a router with 100 milliseconds of egress buffering (standard in the industry today), where traffic bursts at 10 times the port capacity (i.e., 1000%) for 20 milliseconds and then drops to zero.

Time (ms)	Description	Lyon/Brewer (queue depth, in % occupancy)	Invention (bandwidth, in % port capacity)
0	The queues are empty. Since there has been no queue depth so far, Lyon's queue depth is zero and Brewer's time-weighted average is also zero. However, the bandwidth consumed by packets received is 1000% of the port capacity.	0%	1000%
1	The queues are still only 10% full (low	Between 5%	1000%

	queue depth appears to signal low congestion). Brewer's time-weighted average will average 0% and 10%, giving more weight to 10% because it is more recent. This will produce a number between 5% and 10% (even lower than the instantaneous depth). The bandwidth consumed by packets received is still 1000%.	and 10%	
10	The queues are 90% full. Brewer's time-weighted average here will have to be somewhere below 90% because it factors in older values of queue depth and the queue has only been increasing. The bandwidth consumed by packets received is still 1000%.	under 90%	1000%
11	The queues are 100% full. Brewer's time-weighted average will be nearing 100%, its value depending on the weight given to older values of queue depth. Packets are still consuming 1000% of the bandwidth.	Nearing 100%	1000%
20	The queues are 100% full. Brewer's time-weighted average will probably be 100% or a bit less (depending on how older data is weighted) but packets have stopped arriving. As such, the bandwidth consumed by packets received is 0%.	Nearing 100%	0%
30	The queues are down to 90% full. Brewer's time-weighted average will be even higher than 90% because it averages in the recent (higher) depth values. However, no packets are arriving so the bandwidth consumed by packets received is still 0%.	Above 90%	0%

As demonstrated by the above example, determining a time-weighted average byte count, which is what is being measured by Brewer, is completely different from determining the amount of bandwidth consumed by received packets. The time-weighted average byte count, and the amount of bandwidth consumed by received packets are thus **not** equivalent or interchangeable concepts/quantities. In light of this observation, the Applicant respectfully submits that Brewer's determination of the time-weighted average for the actual byte count for a particular queue does not teach or suggest "determining the amount of bandwidth consumed by packets arriving at the egress entity", and neither does it teach or suggest "determining from the bandwidth utilization information and the amount of bandwidth consumed by packets received at each egress queue, a discard probability associated with

each egress queue", both of which are recited in independent claim 1 and which, it will be recalled, have been shown to be absent from Lyon as well.

As per § 2143.03 of the *Manual of Patent Examining Procedure*, in order to establish a *prima facie* case of obviousness, the combined prior art references must teach or suggest all of the claim limitations. Since it has been shown that Lyon and Brewer each fail to teach or suggest at least two of the features of independent claim 1, the Applicant respectfully submits that the combination of these references is not sufficient for establishing a *prima facie* case of obviousness as per § 2143.03 of the MPEP. Accordingly, the Examiner is respectfully requested to withdraw the rejection of independent claim 1.

Claims 2-3, 25-27, 30, 36, 44 and 45 depend from independent claim 1 and, as such, incorporate by reference all the claim features contained therein, including the aforementioned features which have already been shown to be absent from both Lyon and Brewer. Accordingly, for the same reasons as those presented above in support of claim 1, the Applicant respectfully submits that the combination of Lyon and Brewer is not sufficient to establish a *prima facie* case of obviousness for claims 2-3, 25-27, 30, 36, 44 and 45. The Examiner is respectfully requested to withdraw the rejection of dependent claims 2-3, 25-27, 30, 36, 44 and 45.

Claims 37 and 40-43

Independent claims 37 and 40 include language similar to that of independent claim 1. Thus, for the same reasons as those presented above with respect to claim 1, the Applicant respectfully submits that claims 37 and 40 are in allowable form.

Claims 41-43 depend from independent claim 40 and, as such, incorporate by reference all the features contained therein. Accordingly, for the same

reasons as those which apply to claim 40, the Applicant respectfully submits that claims 41-43 are in allowable form.

Claims 46-51 and 57

The Examiner's attention is respectfully directed towards the following emphasized feature of independent claim 46:

> **Claim 46**
> A method of regulating packet flow through a device having an ingress entity, an egress entity, a processing fabric between the ingress entity and the egress entity, and a control entity adapted to process packets prior to transmission thereof to the ingress entity, said method comprising:
>   obtaining congestion information regarding packets received at the egress entity, **wherein obtaining said congestion information includes determining the amount of bandwidth consumed by packets arriving at the egress entity; and**
>   providing the congestion information to the control entity, for use by the control entity in processing packets prior to transmission thereof to the ingress entity.

As already demonstrated, determining a time-weighted average byte count, which is what is being measured by Brewer, is completely different from determining the amount of bandwidth consumed by arriving packets. The time-weighted average byte count, and the amount of bandwidth consumed by arriving packets are thus **not** equivalent or interchangeable concepts/quantities. In light of this observation, the Applicant respectfully submits that Brewer's determination of the time-weighted average for the actual byte count for a particular queue does not teach or suggest "determining the amount of bandwidth consumed by packets arriving at the egress entity", which is recited in independent claim 1 and which, it will be recalled, has been shown to be absent from Lyon as well.

As such, the Applicant respectfully submits that the combination of these references is not sufficient for establishing a *prima facie* case of obviousness as per § 2143.03 of the MPEP. Accordingly, the Examiner is respectfully requested to withdraw the rejection of independent claim 46.

Claims 47-51 and 57 depend from independent claim 46 and, as such, incorporate by reference all the features contained therein, including those already shown to be absent from both Lyon and Brewer. Accordingly, for the same reasons as those presented above with respect to claim 46, the Applicant respectfully submits that the combination of Lyon and Brewer is not sufficient to establish a prima facie case of obviousness for claims 47-51 and 57. The Examiner is respectfully requested to withdraw the rejection of claims 47-51 and 57.

D. Summary of Second Rejection under 35 USC §103(a) and Response

On page 11 of the Office Action, the Examiner has rejected claims 4, 28, 29, 31-35, 54, 55 under 35 USC §103(a) as being unpatentable over Lyon in view of Brewer, in further view of US Patent Application 2002/0105908 (hereafter to be referred to as Blumer).

For the reasons presented below, the Applicant respectfully submits that claims 4, 28, 29, 31-35, 54, 55, as they currently stand, are in allowable form:

Claims 4, 28, 29 and 31-35

Claims 4, 28, 29 and 31-35 depend from independent claim 1 and as such incorporate by reference all the features contained therein, including the following features which have already been shown to be absent from both Lyon and Brewer:

> obtaining bandwidth utilization information regarding packets received at the egress queues, **wherein obtaining said bandwidth utilization information includes determining the amount of bandwidth consumed by packets received at each of said egress queues;**
> **determining, from the bandwidth utilization information and the amount of bandwidth consumed by packets received at each of said egress queues, a discard probability associated with each egress queue;**

It is further submitted that the above feature is also absent from Blumer. Specifically, Blumer merely discloses a mechanism for determining a drop

probability for a buffer using a number of variables. The Examiner has previously, in the Office Action of May 17th, 2006, pointed to paragraph [0029] of Blumer for a description of the variables used. Having reviewed paragraph [0029], the Applicant respectfully submits that the amount of bandwidth consumed by received packets is not one of the variables. As such, Blumer cannot possibly disclose "determining, from the bandwidth utilization information <u>and the amount of bandwidth consumed by packets received at each of said egress queues</u>, a discard probability associated with each egress queue"[emphasis added].

In summary, none of the cited references teaches or suggests the feature of "wherein obtaining said bandwidth utilization information includes determining the amount of bandwidth consumed by packets received at each of said egress queues" of the feature of "determining, from the bandwidth utilization information and the amount of bandwidth consumed by packets received at each of said egress queues, a discard probability associated with each egress queue".

As per § 2143.03 of the *Manual of Patent Examining Procedure*, in order to establish a *prima facie* case of obviousness, the combined prior art references must teach or suggest <u>all</u> of the claim limitations. Since it has been shown that neither Lyon nor Brewer nor Blumer teach two of the features of claims 4, 28, 29 and 31-35, the Applicant respectfully submits that the combination of these references is not sufficient for establishing a *prima facie* case of obviousness as per § 2143.03 of the MPEP. Accordingly, the Examiner is respectfully requested to withdraw his rejection of independent claims 4, 28, 29 and 31-35.

Claims 54 and 55

Claims 54 and 55 depend from independent claim 46 and as such incorporate by reference all the features contained therein, including the following feature which has already been shown to be absent from both Lyon and Brewer.

> obtaining congestion information regarding packets received at the egress entity, **said congestion information including information associated with the amount of bandwidth consumed by packets arriving at the egress entity; and**

It is further submitted that the above feature is also absent from Blumer, which merely teaches a refinement to calculating a drop probability based on queue depth (a quantity of bits stored). Blumer lists in paragraph [0029] a number of other factors that can be taken into account, but the amount of consumed bandwidth is not in the list. As such, Blumer does not teach or suggest the above emphasized feature of independent claim 46.

Accordingly, since neither Lyon nor Brewer nor Blumer teach or suggest the above feature of independent claim 46, and since claims 54 and 55 depend from independent claim 46, the Applicant respectfully submits that the references cited by the Examiner do not support a *prima facie* case of obviousness, as per § 2143.03 of the MPEP. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claims 54 and 55.

E. Summary of Third Rejection under 35 USC §103(a) and Response

On page 16 of the Office Action, the Examiner has rejected claim 50 under 35 USC §103(a) as being unpatentable over Lyon in view of Brewer, in further view of U.S. Patent 6,813,242 (hereafter to be referred to as Haskin). The Applicant respectfully disagrees and traverses this rejection.

Claim 50 depends from independent claim 46 and as such incorporates by reference all the features contained therein, including the following feature which has already been shown to be absent from both Lyon and Brewer:

> **obtaining said congestion information includes determining the amount of bandwidth consumed by packets arriving at the egress entity**

The Applicant further submits that this feature is also absent from Haskin. As can be seen from Haskin's Fig. 3 and the accompanying description in column 4, lines 51-62, Haskin teaches monitoring for the presence of traffic coming into a switch from an external link, and using that information to infer either congestion or a failed link and then reroute traffic. Nowhere does Haskin disclose congestion information that includes "determining the amount of bandwidth consumed by packets arriving at the *egress* entity".

Accordingly, since neither Lyon nor Brewer nor Haskin teach the above feature of independent claim 46, and since claim 50 depends from independent claim 46, the Applicant respectfully submits that the references cited by the Examiner do not support a *prima facie* case of obviousness, as per § 2143.03 of the MPEP. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claim 50.

F. Summary of Fourth Rejection under 35 USC §103(a) and Response

On page 16 of the Office Action, the Examiner has rejected claim 58 under 35 USC §103(a) as being unpatentable over Lyon in view of Brewer, in further view of U.S. Patent 6,728,253 (hereafter to be referred to as Jefferies). The Applicant respectfully disagrees and traverses this rejection.

Claim 58 depends from independent claim 46 and as such incorporates by reference all the features contained therein, including the following features which has already been shown to be absent from both Lyon and Brewer:

> **obtaining said congestion information includes determining the amount of bandwidth consumed by packets arriving at the egress entity**

The Applicant further submits that this features is also absent from Jefferies. As can be seen from Jefferies at col. 2, lines 25-44, this reference relates to

using queue occupancy (buffer depth again) to selectively pause and re-enable transmission to a set of queues. Nowhere does Jefferies disclose congestion information that includes "determining the amount of bandwidth consumed by packets arriving at the *egress* entity".
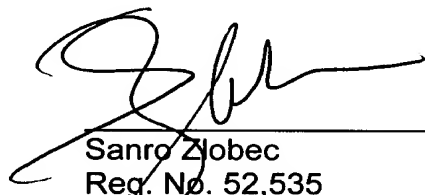
Accordingly, since neither Lyon nor Brewer nor Jefferies teach the above feature of independent claim 46, and since claim 58 depends from independent claim 46, the Applicant respectfully submits that the references cited by the Examiner do not support a *prima facie* case of obviousness, as per § 2143.03 of the MPEP. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claim 58.

II. CONCLUSION

In view of the above, it is respectfully submitted that claims 1-51, 53-55 and 57-58 are in condition for allowance. Reconsideration of the rejections and objections is requested. Allowance of claims 1-51, 53-55 and 57-58 at an early date is solicited.

If the claims of the application are not considered to be in full condition for allowance, for any reason, the Applicant respectfully requests the constructive assistance and suggestions of the Examiner in drafting acceptable claims so that the application can be placed in allowable condition as soon as possible and without the need for further proceedings.

Respectfully submitted,

Sanro Zlobec
Reg. No. 52,535
Agent for the Applicants

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SMART & BIGGAR
1000 De La Gauchetière Street West
Suite 3300
Montreal, Quebec H3B 4W5
CANADA
Telephone: (514) 954-1500
Facsimile: (514) 954-1396